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STEFAN V. CHMIELEWSKI
DELPHI TECHNOLOGIES, INC.
Legal Staff MC CT10C
P.O. Box 9005
Kokomo, IN 46904-9005

EXAMINER	
PERUNGAVOOR, SATHYANARAYA V	
ART UNIT	PAPER NUMBER
2624	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/17/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No. 10/797,411	Applicant(s) KISELEWICH, STEPHEN J.	
	Examiner Sath V. Perungavoor	Art Unit 2624	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 March 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Applicant(s) Response to Official Action

[1] The response filed on March 5, 2007 has been entered and made of record.

Response to Arguments/Amendments

[2] Presented arguments have been fully considered, but are rendered moot in view of the new ground(s) of rejection necessitated by amendment(s) initiated by the applicant(s).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

[3] Claims 1-26 are rejected under 35 U.S.C. 102(a) and 102(e) as being anticipated by Owechko[i] et al. ("Owechko").

Regarding claim 1, Owechko meets the claim limitations, as follows:

A method of object detection comprising the steps of *[Figure 3; Claim 1, Line 1]*: receiving images of an area occupied by at least one object *[300 on Figure 3; Paragraph 0049; Claim 1, Lines 3-4]*; extracting a plurality of differing image features including

wavelet features from the images via separate extraction modules *[302, 304 and 306 on Figure 3; Paragraph 0049; Claim 1, Lines 6-7]*; and performing classification on the plurality of differing image features *(i.e. 302,304,306)* as a unified *(i.e. inputting to the fusion module, 326)* group in at least one common classification algorithm to produce object class confidence data *[302, 304, 306, 314-316, 326 on Figure 3; Paragraph 0049; Claim 1, Lines 9-10; Claim 2, Lines 1-3]*.

Regarding claim 2, Owechko meets the claim limitations, as follows:

The method of claim 1, wherein the object class confidence data includes a detected object estimate *[320-324 on Figure 3; Paragraph 0049; Claim 1, Lines 12-13]*.

Regarding claim 3, Owechko meets the claim limitations, as follows:

The method of claim 2, wherein the at least one object comprises a vehicle occupant and the area comprises a vehicle occupancy area, and further comprising a step of processing the detected object estimate to provide signals to vehicle systems *[Figure 7; Paragraph 0002; Claim 6, Lines 1-5]*.

Regarding claim 4, Owechko meets the claim limitations, as follows:

The method of claim 3, wherein the signals comprise airbag enable and disable signals *[328 on Figure 3; Claim 7, Lines 1-2; Paragraph 0049]*.

Regarding claim 5, Owechko meets the claim limitations, as follows:

The method of claim 4, wherein the method further comprises a step of capturing images from a sensor selected from a group consisting of CMOS vision sensors and CCD vision sensors *[Paragraph 0050; Claim 8, Lines 1-4]*.

Regarding claim 6, Owechko meets the claim limitations, as follows:

The method of claim 1, wherein the at least one common classification algorithm comprises a plurality of common classification algorithms *[Paragraph 0066; Claim 3, Lines 1-5]*.

Regarding claim 7, Owechko meets the claim limitations, as follows:

The method of claim 6, comprising the further step of performing a mathematical function (i.e. GM operator) on the object class confidence data (i.e. input values) from each of the common classification algorithms to thereby arrive at a detected object estimate *[Paragraph 0089]*.

Regarding claim 8, Owechko meets the claim limitations, as follows:

The method of claim 6, comprising the further step of averaging (i.e. mean) the object class confidence data from each of the common classification algorithms to thereby arrive at a detected object estimate *[Paragraph 0090]*.

Regarding claim 9, Owechko meets the claim limitations, as follows:

The method of claim 6, wherein each of the common classification algorithms has at least one different parameter value *[Paragraph 0087]*.

Regarding claim 10, Owechko meets the claim limitations, as follows:

The method of claim 1, wherein said at least one common classification algorithm is selected from the group consisting of a Feedforward Backpropagation Neural Network, a trained C5 decision tree, a trained Nonlinear Discriminant Analysis network, and a trained Fuzzy Aggregation Network *[Paragraph 0066; Claim 3, Lines 1-5]*.

Regarding claim 11, Owechko meets the claim limitations, as follows:

The method of claim 1, wherein the step of extracting image features comprises the step of extracting wavelet coefficients of the images of the at least one object occupying an area *[304 on Figure 3; Paragraph 0057; Claim 4, Lines 1-5]*; and wherein the step of classifying the image features comprises processing the wavelet coefficients with said at least one common classification algorithm *[Paragraph 0059; Claim 4, Lines 5-8]*.

Regarding claim 12, Owechko meets the claim limitations, as follows:

The method of claim 1, wherein the step of extracting image features further comprises the steps of: detecting edges of the at least one object within the images *[306 on Figure 3; Paragraph 0062; Claim 9, Lines 4-5]*; masking the edges with a background mask to find important edges *[Paragraph 0063; Claim 9, Lines 7-8]*; calculating edge pixels from the important edges *[Paragraph 0064; Claim 9, Line 10]*; and producing edge density maps from the important edges, the edge density map

providing the image features, and wherein the step of classifying the image features comprises processing the edge density map with the at least one common classification algorithm *[Paragraph 0065; Claim 9, Lines 12-17]*.

Regarding claim 13, Owechko meets the claim limitations, as follows:

The method of claim 1, wherein the step of extracting image features further comprises the steps of *[Figure 8; Paragraph 0070; Claim 10, Lines 1-2]*: receiving a stereoscopic pair of images of an area occupied by at least one object *[800 on Figure 8; Claim 10, Lines 4-5]*; detecting pattern regions and non-pattern regions within each of the pair of images using a texture filter *[802 on Figure 8; Claim 10, Lines 7-8]*; generating an initial estimate of spatial disparities between the pattern regions within each of the pair of images *[804 on Figure 8; Claim 10, Lines 9-11]*; using the initial estimate to generate a subsequent estimate of the spatial disparities between the non-pattern regions based on the spatial disparities between the pattern regions using disparity constraints *[806 on Figure 8; Claim 10, Lines 13-17]*; iteratively using the subsequent estimate as the initial estimate in the step of using the initial estimate to generate a subsequent estimate in order to generate further subsequent estimates of the spatial disparities between the non-pattern regions based on the spatial disparities between the pattern regions using the disparity constraints until there is no change between the results of subsequent iterations, thereby generating a final estimate of the spatial disparities; and generating a disparity map of the area occupied by at least one object from the final estimate of the spatial disparities *[808 on Figure 8; Claim 10, Lines 18-26]*, and wherein the step of performing classification on the image features

comprises processing the disparity map with the at least one classification algorithm to produce object class confidence data *[804 on Figure 8; Claim 10, Lines 28-33]*.

Regarding claim 14, Owechko meets the claim limitations, as follows:

The method of claim 1, further comprising the steps of: detecting motion of the at least one object within the images *[Claim 11, Lines 4-5]*; calculating motion pixels from the motion *[Claim 11, Line 7]*; and producing motion density maps from the motion pixels, the motion density map providing the image features *[Claim 11, Lines 9-11]*; and wherein the step of classifying the image features comprises processing the motion density map with the at least one classification algorithm to produce object class confidence data *[Claim 11, Lines 13-18]*.

Regarding claim 15, Owechko meets the claim limitations, as follows:

The method of claim 1, wherein the receiving step comprises receiving a stereoscopic pair of images of an area occupied by at least one object, the extracting step including extracting image features from the images, with at least a portion of the image features being extracted by the steps of: detecting pattern regions and non-pattern regions within each of the pair of images using a texture filter; generating an initial estimate of spatial disparities between the pattern regions within each of the pair of images; using the initial estimate to generate a subsequent estimate of the spatial disparities between the non-pattern regions based on the spatial disparities between the pattern regions using disparity constraints; iteratively using the subsequent estimate as the initial estimate in the step of using the initial estimate to

generate a subsequent estimate in order to generate further subsequent estimates of the spatial disparities between the non-pattern regions based on the spatial disparities between the pattern regions using the disparity constraints until there is no change between the results of subsequent iterations, thereby generating a final estimate of the spatial disparities; and generating a disparity map of the area occupied by at least one object from the final estimate of the spatial disparities *[Claim 10: For detailed explanation see claims 1-14].*

Regarding claim 16, Owechko meets the claim limitations, as follows:

A computer program product stored on a computer-readable medium for object detection, the computer program product comprising means, stored on a computer readable medium, for: receiving images of an area occupied by at least one object; extracting a plurality of differing image features including wavelet features from the images via separate extraction modules *[302, 304 and 306 on Figure 3; Paragraph 0049; Claim 1, Lines 6-7]*; and performing classification on the plurality of differing image features *(i.e. 302,304,306)* as a unified *(i.e. inputting to the fusion module, 326)* group in at least one common classification algorithm to produce object class confidence data *[302, 304, 306, 314-316, 326 on Figure 3; Paragraph 0049; Claim 1, Lines 9-10; Claim 2, Lines 1-3].*

Regarding claim 17, Owechko meets the claim limitations, as follows:

A computer program product stored on a computer-readable medium for object detection as set forth in claim 16, wherein the means for performing classification on

the image features as a group comprises a means for processing the image features with at least one classification algorithm, said at least one common classification algorithm being selected from the group consisting of a Feedforward Backpropagation Neural Network, a trained C5 decision tree, a trained Nonlinear Discriminant Analysis network, and a trained Fuzzy Aggregation Network *[Claim 57: For detailed explanation see claims 1-14]*.

Regarding claim 18, Owechko meets the claim limitations, as follows:

A computer program product stored on a computer-readable medium for object detection as set forth in claim 16, wherein the means for extracting image features comprises a means for extracting wavelet coefficients of the at least one object in the images, and wherein the means for classifying the image features comprises a means for processing the wavelet coefficients with the at least one classification algorithm, at least one of the classification algorithms being selected from the group consisting of a Feedforward Backpropagation Neural Network, a trained C5 decision tree, a trained Nonlinear Discriminant Analysis network, and a trained Fuzzy Aggregation Network *[Claims 58 and 59: For detailed explanation see claims 1-14]*.

Regarding claim 19, Owechko meets the claim limitations, as follows:

A computer program product stored on a computer-readable medium for object detection as set forth in claim 18, wherein the means for extracting image features further comprises means for: detecting edges of the at least one object within the images; masking the edges with a background mask to find important edges;

calculating edge pixels from the important edges; and producing edge density maps from the important edges, the edge density map providing the image features, and wherein the means for classifying the image features processes the edge density map with the at least one classification algorithm to produce object class confidence data *[Claim 63: For detailed explanation see claims 1-14]*.

Regarding claim 20, Owechko meets the claim limitations, as follows:

A computer program product stored on a computer-readable medium for object detection as set forth in claim 19, wherein the means for extracting image features further comprises means for: receiving a stereoscopic pair of images of an area occupied by at least one object; detecting pattern regions and non-pattern regions within each of the pair of images using a texture filter; generating an initial estimate of spatial disparities between the pattern regions within each of the pair of images; using the initial estimate to generate a subsequent estimate of the spatial disparities between the non-pattern regions based on the spatial disparities between the pattern regions using disparity constraints; iteratively using the subsequent estimate as the initial estimate in the means for using the initial estimate to generate a subsequent estimate in order to generate further subsequent estimates of the spatial disparities between the non-pattern regions based on the spatial disparities between the pattern regions using the disparity constraints until there is no change between the results of subsequent iterations, thereby generating a final estimate of the spatial disparities; and generating a disparity map of the area occupied by at least one object from the final estimate of the spatial disparities, and wherein the means for classifying the

image features processes the disparity map with the at least one classification algorithm to produce object class confidence data *[Claim 64: For detailed explanation see claims 1-14]*.

Regarding claim 21, Owechko meets the claim limitations, as follows:

An apparatus for object detection comprising a computer system including a processor, a memory coupled with the processor, an input coupled with the processor for receiving images, and an output coupled with the processor for outputting information based on an object estimation, wherein the computer system further comprises means, residing in its processor and memory, for: receiving images of an area occupied by at least one object; extracting a plurality of differing image features including wavelet features from the images via separate extraction modules *[302, 304 and 306 on Figure 3; Paragraph 0049; Claim 1, Lines 6-7]*; and performing classification on the plurality of differing image features *(i.e. 302,304,306)* as a unified *(i.e. inputting to the fusion module, 326)* group in at least one common classification algorithm to produce object class confidence data *[302, 304, 306, 314-316, 326 on Figure 3; Paragraph 0049; Claim 1, Lines 9-10; Claim 2, Lines 1-3]*.

Regarding claim 22, Owechko meets the claim limitations, as follows:

An apparatus for object detection as set forth in claim 21, wherein the means for classifying image features comprises a means for processing the image features with the at least one classification algorithm, the at least one classification algorithm being selected from the group consisting of a Feedforward Backpropagation Neural

Network, a trained C5 decision tree, a trained Nonlinear Discriminant Analysis network, and a trained Fuzzy Aggregation Network *[Claim 111: For detailed explanation see claims 1-14].*

Regarding claim 23, Owechko meets the claim limitations, as follows:

An apparatus for object detection as set forth in claim 21, wherein means for extracting image features comprises a means for: extracting wavelet coefficients of the at least one object in the images; and wherein the means for classifying the image features comprises processing the wavelet coefficients with the at least one classification algorithm to produce object class confidence data, the at least one classification algorithm being selected from the group consisting of a Feedforward Backpropagation Neural Network, a trained C5 decision tree, a trained Nonlinear Discriminant Analysis network, and a trained Fuzzy Aggregation Network *[Claims 112 and 113: For detailed explanation see claims 1-14].*

Regarding claim 24, Owechko meets the claim limitations, as follows:

An apparatus for object detection as set forth in claim 23, wherein the means for extracting image features further comprises means for: detecting edges of the at least one object within the images; masking the edges with a background mask to find important edges; calculating edge pixels from the important edges; and producing edge density maps from the important edges, the edge density map providing the image features; wherein the means for classifying the image features processes the edge density map with at least one of the classification algorithms to produce object

class confidence data; and wherein the means for extracting image features further comprises means for: receiving a stereoscopic pair of images of an area occupied by at least one object; detecting pattern regions and non-pattern regions within each of the pair of images using a texture filter; generating an initial estimate of spatial disparities between the pattern regions within each of the pair of images; using the initial estimate to generate a subsequent estimate of the spatial disparities between the non-pattern regions based on the spatial disparities between the pattern regions using disparity constraints; iteratively using the subsequent estimate as the initial estimate in the means for using the initial estimate to generate a subsequent estimate in order to generate further subsequent estimates of the spatial disparities between the non-pattern regions based on the spatial disparities between the pattern regions using the disparity constraints until there is no change between the results of subsequent iterations, thereby generating a final estimate of the spatial disparities; and generating a disparity map of the area occupied by at least one object from the final estimate of the spatial disparities, and wherein the means for classifying the image features processes the disparity map with the at least one classification algorithm to produce object class confidence data *[Claims 117 and 118: For detailed explanation see claims 1-14]*.

Regarding claim 25, Owechko meets the claim limitations, as follows:

An apparatus for object detection as set forth in claim 23, wherein the means for extracting image features further comprises means for: receiving a stereoscopic pair of images of an area occupied by at least one object; detecting pattern regions and

non-pattern regions within each of the pair of images using a texture filter; generating an initial estimate of spatial disparities between the pattern regions within each of the pair of images; using the initial estimate to generate a subsequent estimate of the spatial disparities between the non-pattern regions based on the spatial disparities between the pattern regions using disparity constraints; iteratively using the subsequent estimate as the initial estimate in the means for using the initial estimate to generate a subsequent estimate in order to generate further subsequent estimates of the spatial disparities between the non-pattern regions based on the spatial disparities between the pattern regions using the disparity constraints until there is no change between the results of subsequent iterations, thereby generating a final estimate of the spatial disparities; and generating a disparity map of the area occupied by at least one object from the final estimate of the spatial disparities, and wherein the means for classifying the image features processes the disparity map with the at least one classification algorithm to produce object class confidence data *[Claim 118: For detailed explanation see claims 1-14]*.

Regarding claim 26, Owechko meets the claim limitations, as follows:

An apparatus for object detection as set forth in claim 21, wherein the computer system further comprises means, residing in its processor and memory, for: receiving a stereoscopic pair of images of an area occupied by at least one object; extracting image features from the images, with at least a portion of the image features being extracted by means for: detecting pattern regions and non-pattern regions within each of the pair of images using a texture filter; generating an initial estimate of

spatial disparities between the pattern regions within each of the pair of images,; using the initial estimate to generate a subsequent estimate of the spatial disparities between the non-pattern regions based on the spatial disparities between the pattern regions using disparity constraints; iteratively using the subsequent estimate as the initial estimate in the means for using the initial estimate to generate a subsequent estimate in order to generate further subsequent estimates of the spatial disparities between the non-pattern regions based on the spatial disparities between the pattern regions using the disparity constraints until there is no change between the results of subsequent iterations, thereby generating a final estimate of the spatial disparities; and generating a disparity map of the area occupied by at least one object from the final estimate of the spatial disparities; and performing classification on the image features as a group in at least one common classification algorithm to produce object class confidence data, with at least a portion of the classifying being performed by processing the disparity map with the at least one classification algorithm to produce object class confidence data *[Claim 118: For detailed explanation see claims 1-14]*.

Conclusion

[4] Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the

THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact Information

[5] Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mr. Sath V. Perungavoor whose telephone number is (571) 272-7455. The examiner can normally be reached on Monday to Friday from 8:30am to 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Matthew C. Bella whose telephone number is (571) 272-7778, can be reached on Monday to Friday from 9:00am to 5:00pm. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Dated: April 10, 2007

Matthew C. Bella
Sath V. Perungavoor
Telephone: (571) 272-7455

Matthew C. Bella

MATTHEW C. BELLA
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600

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